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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,146	04/01/2004	Se-Wan Kim	0630-1988PUS1	7347
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BIRCH STEWART KOLASCH & BIRCH			OLSEN, LIN B	
PO BOX 747			ART UNIT	PAPER NUMBER
FALLS CHURCH, VA 22040-0747			3609	
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)
	10/814,146	KIM, SE-WAN
Examiner	Art Unit	
Lin B. Olsen	3609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 01 April 2004.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-15 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-3, 5-12, 15 is/are rejected.

7) Claim(s) 4, 13, 14 is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 01 April 2007 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date *See Continuation Sheet.*

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ .

5) Notice of Informal Patent Application

6) Other: ____ .

DETAILED ACTION***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

Claims 1, 7 and 9 are objected to because of the following informalities:

In claim 1, there is no antecedent basis for the term "ultrasonic signal oscillating means". Examiner will examine the claim assuming that the phrase "ultrasonic signal generated means" is "ultrasonic signal oscillating means".

In claim 7, there is no antecedent basis for the term "ultrasonic signal oscillating means".

In claim 9, there is no an action commensurate with compensation of a position error. Checking the position of the mobile robot using the method outlined, does not correct an error.

Appropriate correction is required.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686

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F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over **claim 1** of copending Application No. 10/743,493. Although the conflicting claims are not identical, they are not patentably distinct from each other because:

- While the claim in the application uses a RF signal and the claim in the copending application uses an IR signal, they are obvious variants of signals that travel at the speed of light. Since the purpose of the electromagnetic signal is to start a timing period in each application, they are obvious variants of an element.
- While the claim in the application has the mobile robot initiate the RF signal and the claim in the copending application is silent as to the origin of the IR signal, the difference is negligible since the speed of either an IR or RF signal is many times faster than the speed of sound. Therefore, there is imperceptible time difference between one transition from charging station to robot and two transitions of that distance.

- The remainder of the claims is an obvious variant of the wording.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,758,691 to De Bruyne (hereafter referred to as De Bruyne). De Bruyne teaches an apparatus for determining the position of a movable object.

Regarding independent claim 1,

- "a mobile robot" in the preamble, reads on De Bruyne's movable object, because none of the functions of a robot are used or referred to in the body of the claim. It is the fact that both the robot and movable object move, that requires that a means be found to determine the object's position.
- "calculating time taken for each ultrasonic signal generated by ultrasonic signal generated [oscillating] means of a charging station to reach the mobile robot on the basis of a point of time at which a radio frequency

(RF) emitted from the mobile robot is emitted" reads on col. 2, lines 64-68 where the method successively measures the traveling times of ultrasonic pulses from two transmitters on a base station to the ultrasound receiver on the moving object. The measurement is from a the time of a transmission of pulses in the region of visible or invisible light to indicate the start of the ultrasonic transmissions, col. 2, lines 4-10. The examiner takes official notice that both RF frequencies and visible and invisible light frequencies travel at the same speed and are hence equivalent in this application.

- "calculating a distance between the charging station and the mobile robot based on the calculated reaching time" reads on col.3, lines 18-23 where the distances d_1 and d_2 are determined.
- "calculating an angle between the charging station and the mobile robot based on the calculated distance value and a preset distance value between the ultrasonic signal oscillating means." Reads on col.3, lines 18-42 where the known distance D between the transmitters is used in conjunction with the values d_1 and d_2 to calculate the x and y coordinates. The angle can be calculated as easily as the coordinates.

Regarding independent **claim 7**, " An apparatus for detecting a position of a mobile robot generates an RF (Radio Frequency) signal and ultrasonic signals, calculates reaching time taken for each ultrasonic signal to reach the mobile robot on the basis of a point of time at which the RF signal is generated and

detects a position of the mobile robot based on the reaching time and a preset distance value between the ultrasonic signal oscillating means for oscillating the ultrasonic signals." This apparatus reads on the system of De Bruyne, where the ultrasonic transmitters and signal receiver are on the base station and the ultrasonic receiver means and signal transmitter is on the movable object. See Fig. 1, and col. 2, line 50 to col. 3 line 23. The correspondence of the visible signals to the RF signals has been discussed with regard to claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2, 8 –11 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Bruyne as described above.

Regarding **claim 2**, which depends on claim 1

“wherein the angle between the charging station and the mobile robot is calculated through triangulation based on the calculated distance value and the preset distance value between the ultrasonic signal oscillating means.” Reads on col. 3, lines 18-24, where the distances d_1 and d_2 to the moving object are determined and the distance D between the two ultrasonic oscillating means is known. The examiner takes official notice that triangulation is a technique well known those in the engineering sciences. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the known technique of triangulation in De Bruyne to determine the angle between the moving object and the base station.

Regarding independent **claim 8**,

- “an RF generating means installed at a mobile robot and for emitting an RF (Radio Frequency) signal” see discussion of claim 1 and Fig.1, item 7 in element M.
- “an RF reception means installed at a charging station and for receiving the RF signal emitted by the RF generating means” see discussion at claim 1 and Fig. 1, item 5 in element B.
- “ultrasonic signal oscillating means each installed at the charging station and for oscillating ultrasonic signals” see discussion at claim 1 and Fig. 1, elements 1 and 2.

- “a control means for controlling the ultrasonic signal oscillating means so that the ultrasonic signals are oscillated whenever the RF signal is received by the RF reception means” See discussion at claim 1 and Fig. 1 element 4,
- “ultrasonic signal reception means installed on an outer circumferential surface of the mobile robot and for receiving the ultrasonic signals oscillated by the ultrasonic signal oscillating means” See discussion at claim 1 and Fig. 1, element 6. The Examiner notes that the ultrasonic receiver in the reference is on an outer edge of the mouse, which is equivalent to the circumference or a round mobile robot.
- “a microcomputer installed in the mobile robot and for calculating a distance and an angle between the mobile robot and the charging station based on reaching time taken for each ultrasonic signals to reach the mobile robot and a preset distance value between the ultrasonic signals oscillating means.” The reference shows a calculating capability (a computer) at the base station rather than at the mouse. At the time of the reference, a computer would not fit in a device such as a mouse. At col. 8, lines 13-25 various alternative placements of the components of the apparatus are suggested. Placing the computer on the robot is within the simple substitutions that are possible based on this part of the reference.

Regarding **claim 9**, which depends on claim 8, “wherein the microcomputer compensates a position error of the mobile robot by checking the

position of the mobile robot based on the calculated distance value and angle value." It has been shown that the reference allows computation of the position of the movable object – col. 2 line 64 to col. 3 line 42. Therefore, if the microcomputer had a position of the movable device based on another methodology, the position error could be determined by simple arithmetic.

Regarding **claim 10**, which depends on claim 8, "wherein the ultrasonic signal oscillating means are installed to be symmetric to each other in a horizontal direction of the charging station." reads on the reference Fig. 1, elements 1 and 2.

Regarding **claim 11**, "wherein the ultrasonic signal oscillating means are installed to be symmetric to each other in vertical and horizontal directions at the charging station." The examiner takes official notice that only the distance between the ultrasonic oscillating means is used in determining the position of the robot. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to place the oscillating means at substitute locations yielding the same positioning information.

Claims 3, 5-6, 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Bruyne as described above in view of U.S. Patent No. 4,207,571 to Passey (hereafter referred to as Passey). Passey is concerned with navigation aids.

Regarding **claim 3**, which is dependent on claim 1, "wherein the RF signal is emitted at preset time intervals". Does not read on DeBruyne, because in DeBruyne the moving object sends an IR signal when it wishes to determine a position, rather than at regular intervals. The limitation does read on Passey, col.2 lines 27-29, which uses RF signals that are sent at regular intervals to allow measuring the distance at regular times. Further, while Passey uses RF signals, it teaches that one can use IR, UV and visible light in place of RF, Col. 1, lines 18-23. It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a known RF transmitting/receiving element excited at regular intervals for the infrared transmitting/receiving element transmitting intermittently to obtain the predictable result of a signal transmitted at the speed of light that allows measurement of the distance at any time.

Regarding **claim 5**, "adding a semidiameter of the mobile robot to the distance value between the charging station and the mobile robot" does not read on De Bruyne because De Bruyne places the ultrasonic transducer at the point of measurement. When applicant adds a semidiameter to the distances calculated they are producing a reading from a single point. The application does however, read on Passey which places the ultrasonic receivers outboard of the center of the target. At col. 2, lines 55-57, Passey notes that the range readings calculated based on the ultrasonic receivers displaced from a centerline can be integrated, by well known methods, to produce a single range reading. It would have been obvious to one of ordinary skill in the art at the time of the invention to

apply the known technique correcting for the displacement of the measurement point to De Bruyne's device if the ultrasonic receiver were placed atop the target.

Regarding **claim 6**, which is dependent on claim 1, "wherein the distance value between the charging station and the mobile robot is detected through expression $S=340[m/sec]. \text{times.}(T1-T2)$, wherein $340[m/sec]$ is sound velocity, $T1$ is time taken to receive an ultrasonic signal, and $T2$ is time taken to oscillate an ultrasonic signal after receiving an RF signal." Is implied by De Bruyne at col. 3, lines 18-21 where the counters are started at the time the ultrasonic transmitter oscillates and therefore $T1-T2$ is accomplished. Further, claim 6 reads on Passey where the electromagnetic signal and the sonic signals are transmitted simultaneously, so that $T2= 0$, col. 1, lines 16-18 and col. 2, lines 14-17. Passey teaches that the conversion of time periods into distance depends on the local speed of sound, col. 3, lines 14-15, which encompasses the claim's use of 340 m/sec as the speed of sound.

Regarding **claim 12**, which depends on claim 8, "wherein the microcomputer detects reaching time taken for each ultrasonic signal to be received by one or more ultrasonic signal reception means after being oscillated by the ultrasonic signal oscillating means on the basis of a point of time at which an RF signal, which is generated at preset time intervals, is generated; calculates a distance between the mobile robot and the charging station based on the detected reaching time; and calculates an angle between the mobile robot and

the charging station through triangulation based on the detected reaching time and the preset distance value between the ultrasonic signal oscillating means."

This claim recites the elements of claim 1 which has been rejected by De Bruyne, which uses one ultrasonic signal reception means, Fig 1, element 6. The claim adds the RF signal being generated at present intervals to the limitations of claim 1, which is not taught by De Bruyne. The limitation does read on Passey, col.2 lines 27-29, which uses RF signals that are sent at regular intervals to allow measuring the distance at regular times. It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a known RF transmitting/receiving element excited at regular intervals for the transmitting/receiving element transmitting intermittently to obtain the predictable result of a signal traveling at the speed of light that allows measurement of the distance at regular intervals.

Regarding **claim 15**, which is dependent on claim 8, "wherein the microcomputer detects the distance between the charging station and the mobile robot through expression $S=340[m/sec].times.(T1-T2)$, wherein 340[m/sec] is sound velocity, T1 is time taken to receive an ultrasonic signal, and T2 is time taken to oscillate an ultrasonic signal after receiving an RF signal." Reads on Passey where the electromagnetic signal and the sonic signals are transmitted simultaneously, so that $T2=0$, col. 1, lines 16-18 and col. 2, lines 14-17. Passey teaches that the conversion of time periods into distance depends on the local

speed of sound, col. 3, lines 14-15, which encompasses the claim's use of 340 m/sec as the speed of sound.

Claim Rejections - 35 USC § 103

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patent Application No. 10/743,493 published as Patent Publication No. 2005/0021179 to Kim et al. (hereafter referred to as Kim1). Kim1 is concerned with detecting the position of a mobile robot.

Regarding independent claim 1,

- "calculating time taken for each ultrasonic signal generated by ultrasonic signal generated [oscillating] means of a charging station to reach the mobile robot on the basis of a point of time at which a radio frequency (RF) emitted from the mobile robot is emitted" reads on Page 2, ¶26 except that reference uses an IR signal while the applicant uses an RF signal. The Examiner takes official notice that both RF and IR signals travel at the speed of light and so it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute them for each other yielding predictable results. Further, while the reference has the IR signal originating outside the mobile robot, the applicant has the mobile robot initiate the RF signal. The examiner takes official notice that RF and IR signals travel significantly faster than the speed of sound, therefore it would have been obvious to one of ordinary skill in the art at

the time of the invention to move the origin of the trigger signal without a loss of accuracy in the measurement.

- “calculating a distance between the charging station and the mobile robot based on the calculated reaching time,” reads on Fig. 2, first and second distance calculating unit and P2, ¶26.
- “calculating an angle between the charging station and the mobile robot based on the calculated distance value and a preset distance value between the ultrasonic signal oscillating means.” Reads on Fig. 2, and P2, ¶ 34 referring to distance and angle calculator 215.

Allowable Subject Matter

Claims 4, 13 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The cited prior art does not suggest or teach the use of multiple ultrasonic receiving means identified by a prestored position number used in order to detect the direction in which the robot is proceeding. Further the cited prior art does not teach or suggest using the two fastest reaching time values to determine the distance between the mobile robot and the charging station.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lin B. Olsen whose telephone number is 571-

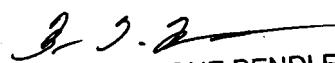
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272-9754. The examiner can normally be reached on M-F, 7:30am-5:00pm EST, Alternate Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian T. Pendleton can be reached on 571-272-7527. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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BRIAN TYRONE PENDLETON
SUPERVISORY PATENT EXAMINER

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date
11/3/2004,8/11/2005,5/2/2006,7/3/2007.